Configuring LNM Services

Router Software Version 11.0
Site Manager Software Version 5.0

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Bay Networks

Bay Networks

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About This Guide

If you are responsible for configuring and managing Bay Networks routers, read this guide to learn how to customize router software for LNM services. The LNM Servers are the Bay Networks implementation of the five LAN management servers described in the *IBM Token Ring Architecture Reference*.

Configuring LNM Services offers

- An overview of the LNM routing protocol and a description of how Bay Networks routing servers work (Chapter 1)
- Implementation notes that may affect how you configure LNM Servers (Chapter 2)
- Instructions on enabling LNM Servers (Chapter 3)
- Instructions on editing LNM global and interface parameters and configuring LNM Servers (Chapter 4)

Before You Begin

Before using this guide, you must complete the following procedures:

- Create and save a configuration file that has at least one set of LNM Servers and a Source Routing Bridge interface.
- Retrieve the configuration file in local, remote, or dynamic mode.

Refer to *Configuring Routers* for instructions.

Conventions

angle brackets (< >)	Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: if command syntax is **ping** *<ip_address>*, you enter **ping 192.32.10.12**
bold text	Indicates text that you need to enter, command names, and buttons in menu paths. Example: Enter **wfsm &**
	Example: Use the **dinfo** command.
	Example: ATM DXI > Interfaces > **PVCs** identifies the PVCs button in the window that appears when you select the Interfaces option from the ATM DXI menu.
brackets ([ ])	Indicate optional elements. You can choose none, one, or all of the options.
italic text	Indicates variable values in command syntax descriptions, new terms, file and directory names, and book titles.
quotation marks (“ ”)	Indicate the title of a chapter or section within a book.
`screen text`	Indicates data that appears on the screen. Example: `Set Bay Networks Trap Monitor Filters`
separator (>)	Separates menu and option names in instructions and internal pin-to-pin wire connections. Example: Protocols > AppleTalk identifies the AppleTalk option in the Protocols menu.
	Example: Pin 7 > 19 > 20
vertical line (|)	Indicates that you enter only one of the parts of the command. The vertical line separates choices. Do not type the vertical line when entering the command. Example: If the command syntax is
	show at routes | **nets**, you enter either **show at routes** or **show at nets**, but not both.

Acronyms

ANSI	American National Standards Institute
ARP	Address Resolution Protocol
ATM	Asynchronous Transfer Mode
CMIP	Common Management Information Protocol
EGP	Exterior Gateway Protocol
FDDI	Fiber Distributed Data Interface
IEEE	Institute of Electrical and Electronic Engineers
ILI	intelligent link interface
IS-IS	Intermediate System to Intermediate System
LNM	LAN network manager
MAC	media access control
MOP	Maintenance Operations Protocol
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First
PVCs	permanent virtual circuits
QENET	Quad Ethernet Link Module
RIP	Routing Information Protocol
SMDS	Switched Multimegabit Data Services
SNAP	Subnetwork Access Protocol
SNMP	Simple Network Management Protocol
SRM	system resource modules
SVCs	switched virtual circuits
TCP/IP	Transmission Control Protocol/Internet Protocol
TFTP	Trivial File Transfer Protocol

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Chapter 1
LNM Servers Overview

LNM Services are embodied in the LNM Servers program, the Bay Networks implementation of the five LAN management servers described in the *IBM Token Ring Architecture Reference*. The LNM Servers provide a means for an IBM LAN Network Manager application to monitor and control stations attached to a locally attached token-ring LAN.

Note: Bay Networks system software does not support the use of IBM LAN Network Manager to manage or monitor 802.3/Ethernet LAN segments or adapters through a Source-Routing-Translating Bridge.

This chapter provides

- A brief overview of the IBM LAN Network Manager (LNM) application program
- An overview of the Bay Networks LNM Servers
- A list of additional technical resources

IBM LAN Network Manager

IBM LAN Network Manager is a PC application that allows a network administrator to manage multisegment 802.5/token-ring networks. The administrator of a building or campus network can use IBM LAN Network Manager to monitor a single LAN or a group of LANs.

IBM LAN Network Manager can also communicate with the IBM NetView host-based network management product. This enables a NetView administrator to gain access to certain operating capabilities of the IBM LAN Network Manager application.

IBM LAN Network Manager provides facilities for managing the media and adapters within a LAN, and for managing source-routing bridges that interconnect LAN segments.

When using an IBM LAN Network Manager workstation, a network administrator can

- Display alerts and recommended actions
- Generate event log reports
- Query, remove, or monitor adapters within the network
- Establish a communications link with an IBM bridge for the purposes of LAN management
- Query and configure IBM bridges
- Monitor token-ring network status and errors
- Perform token-ring path tests and LAN segment tests

When accessing IBM LAN Network Manager via IBM NetView, a network administrator can

- Display IBM LAN Network Manager alerts and recommended actions
- Generate IBM LAN Network Manager event log reports
- Issue commands to IBM LAN Network Manager

Within a token-ring LAN environment, IBM LAN Network Manager can access two different levels of management:

- Local services
- Network-wide services

These services are provided by LNM Servers; see “LNM Management Servers” later in this chapter for a discussion of servers.

Local Services

Local services provided by LNM Servers enable you to control each station attached to a token-ring segment.

Some examples of local services provided by LNM Servers are

- Initializing new stations with the same parameters used to initialize all other stations attached to the same ring
- Noting the address of the Next Active Upstream Neighbor for each station on a ring
- Collecting error detection messages placed on a specified ring by stations already attached to the same ring

Network-Wide Services

Network-wide services provided by LNM Servers enable you to configure and monitor, from a central site, the operation of each segment of a token-ring LAN.

Some examples of network-wide services are

- Requesting statistics or configuration information from LNM Servers
- Removing a ring station from a designated ring
- Collecting error information on the operation of a designated ring
- Permitting manual intervention where necessary to resolve certain operational problems existing on a designated ring

LAN Management Servers

The *IBM Token Ring Architecture Reference* defines five servers that provide local, network-wide, or both types of services to the IBM LAN Network Manager application.

The servers are

- LAN Reporting Mechanism (LRM)
- Ring Error Monitor (REM)
- Ring Parameter Server (RPS)
- Configuration Report Server (CRS)
- LAN Bridge Server (LBS)

REM, RPS, and CRS are MAC sublayer servers, and each has its own *functional address* on the physical LAN it helps to observe or control (Table 1-1).

Table 1-1. MAC Sublayer Servers and Their Functional Addresses

MAC Sublayer Server	Functional Address
REM	C00000000008
RPS	C00000000002
CRS	C00000000002

LRM and LBS are not MAC sublayer servers, and hence have no MAC functional address. LRM and LBS are addressed by means of LLC2 sessions and a protocol internal to the LNM Servers interface.

Ring stations send frames onto the ring to report various conditions. These are MAC frames, and are sent to a particular functional address. The functional addresses of the management servers REM, RPS, and CRS are reserved by IBM for this purpose. For more information on functional addresses, refer to the *IBM Token Ring Network Architecture Reference.*

Figure 1-1 shows the five servers as LLC and MAC sublayer components configured on a token-ring circuit. The servers are configured on the same circuit as the source-routing bridge interface for the locally attached ring.

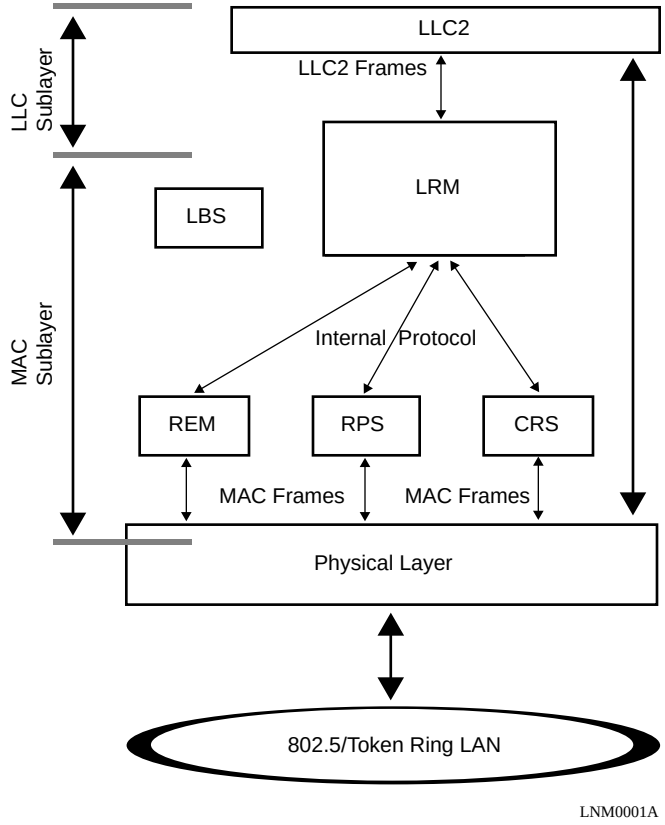


Figure 1-1. The LNM Servers

The following sections provide an overview of the five management servers.

LAN Reporting Mechanism (LRM)

The Bay Networks implementation of LRM is one of five LAN management servers you configure on a token-ring circuit. LRM supplies network-wide services to the IBM LAN Network Manager application. (The services do not extend beyond the topology of the local token ring.) To supply these services, LRM manages all communications between the IBM LAN Network Manager application and the other management servers.

LRM supports the following major functions:

- Reporting Link Maintenance Function
- Control Function
- Routing Function
- Notification Function
- Security Function
- Protocol Boundary Function

Reporting Link Maintenance Function

The LRM Reporting Link Maintenance Function maintains a separate LLC2 connection (called a *reporting link*) to each IBM LAN Network Manager workstation. Other management servers (REM, RPS, CRS, and LBS) use the reporting links managed by LRM to communicate with the IBM LAN Network Manager, rather than having each server manage its own independent links with the IBM LAN Network Manager workstation.

If a Bay Networks router becomes the only station on a token ring segment, the router removes and reinserts itself on the ring. As a result:

- Any reporting link established between a remote IBM LAN Network Manager and the LNM Servers on that segment fails.
- The IBM LAN Network Manager Events Log receives an alert message indicating the failure of the reporting link.

If you want to ensure that the IBM LAN Network Manager maintains a reporting link to the LNM Servers on the local Bay Networks bridge, you can enable autolinking on the IBM LAN Network Manager. It can then reopen the failed reporting link when the Bay Networks LNM Servers interface becomes active on the ring.

You can also set the “Auto-link time interval” in the IBM LAN Network Manager System Parameters to a value that achieves the best balance between the amount of time in which you require access to the Bay Networks LNM Servers on the desired segment and the potential traffic generated by periodic attempts to reestablish the failed reporting link. You can also disable autolinking on an unnecessary reporting link.

Control Function

The LRM Control Function allows the LAN reporting mechanism to define

- One IBM LAN Network Manager as the *controlling* manager
- One or more IBM LAN Network Managers as noncontrolling or *observing* IBM LAN Network Managers

LRM maintains communication between its local management servers and all authorized IBM LAN Network Manager entities. (The LNM Servers include authorization password functionality, described later in this chapter.)

Figure 1-2 shows one LRM server reporting to multiple IBM LAN Network Manager clients, with only one client controlling the functions and actions of the management servers. Figure 1-2 also shows three Observing LAN Network Managers, which are described later in this chapter.

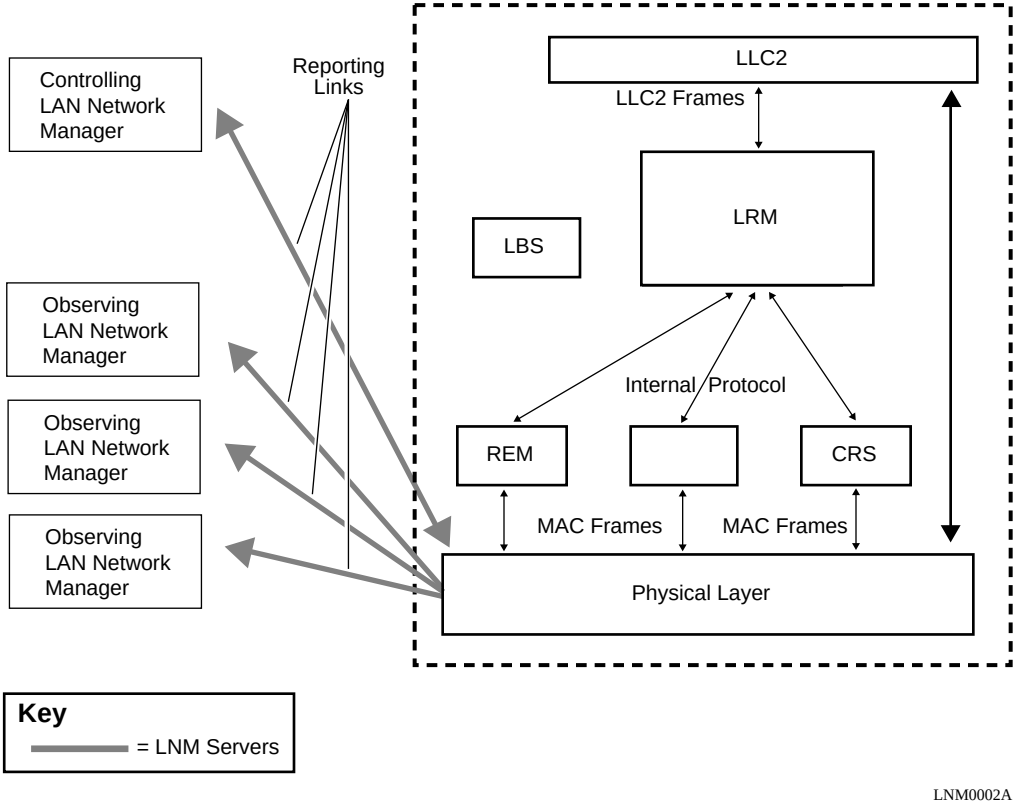


Figure 1-2. Controlling and Observing LAN Network Managers

Routing Function

The LRM Routing Function forwards frames from an IBM LAN Network Manager to the appropriate management server (REM, RPS, CRS, or LBS). The routing function also forwards responses and unsolicited notifications from the management servers to selected remote IBM LAN Network Manager applications.

Notification Function

The LRM Notification Function notifies an IBM LAN Network Manager when requests for new reporting links are accepted or rejected.

Security Function

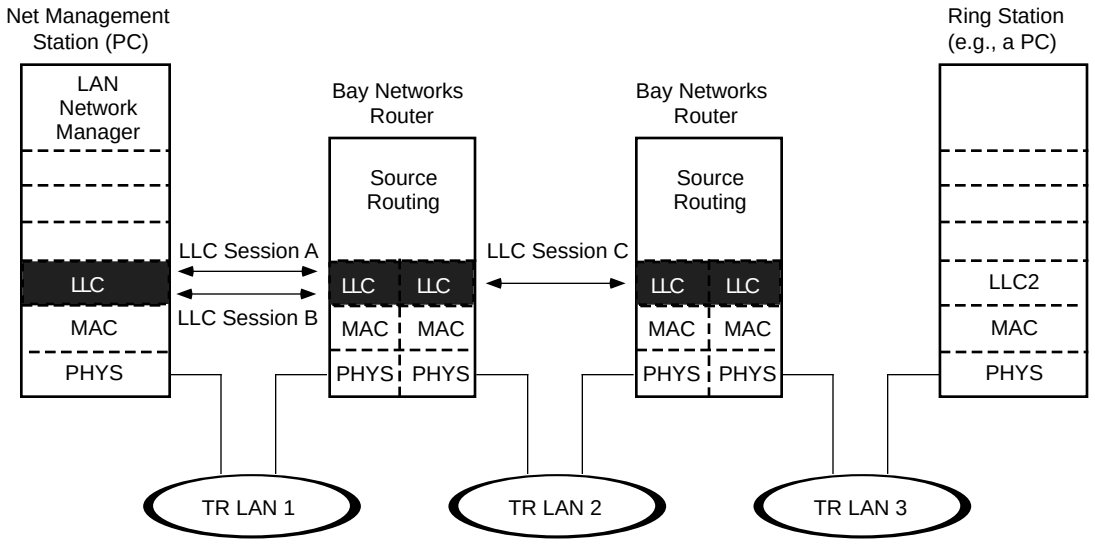
The LRM Security Function maintains and checks ASCII passwords that are used to authenticate users of reporting links.

Protocol Boundary Function

The LRM Protocol Boundary Function allows communication between LRM and its associated management servers. The protocol boundary function also provides a means for management servers to inform LRM about their state (active or inactive).

LLC Requirements

To provide enterprise-wide services for the IBM LAN Network Manager application, LRM requires the presence of an LLC2 sublayer on the same source-routing bridge. LLC2 services are necessary to support reporting links to the IBM LAN Network Manager application (Figure 1-3).



Note: LLC Session A communicates information about TR LAN 2.
LLC Sessions B and C communiate information about TR LAN 3.

Network Management Station collects information about TR LAN 1, 2, and 3.

LNM0003A

Figure 1-3. Reporting Links via Multiplexed LLC2 Sessions

Note: For more information on LLC support for the LNM Servers, refer to *Configuring LLC Services*.

You initially establish the reporting link through the “Bridge Link” function of the IBM LAN Network Manager application software. (For more information on how to use the Bridge Link function, refer to the *IBM LAN Network Manager User’s Guide.*)

Ring Error Monitor (REM)

The Bay Networks implementation of REM is one of five LAN management servers you configure on a token-ring circuit. REM observes, collects, and analyzes hard-error and soft-error reports sent by ring stations on a single ring, and assists in fault isolation and correction. The REM functional address on the ring is the destination address for all soft-error reports generated by ring stations. Hard-error reports are sent to the all-stations MAC address and examined by the REM hard-error analysis program.

REM supports the following functions:

- Hard-Error Processing Function
- Soft-Error Processing Function

Hard-Error Processing Function

The REM Hard-Error Processing Function detects and reports hard errors. Hard errors are permanent or temporary faults, usually in equipment attached to a ring. Permanent hard errors cannot be corrected by software; temporary hard errors can be corrected by software.

Hard errors typically cause a ring to cease operating. A ring station downstream from the faulty station recognizes a hard error, and transmits Beacon MAC frames at specified intervals, until the faulty station removes itself from the affected ring.

Soft-Error Processing Function

The REM Soft-Error Processing Function determines whether a nonrandom or excessive soft-error condition is occurring on the ring to which REM is attached. If possible, REM isolates the most probable source of the soft errors to a single fault domain, where fault domain consists of a ring station, its Next Active Upstream Neighbor, and the media between them.

The REM Soft-Error Processing Function includes the following additional functions:

- Soft-Error Reporting Function
- Nonisolating Soft-Error Processing Function
- Isolating Soft-Error Processing Function
- Intensive Mode Reporting Function

- Receiver-Congestion Error Reporting Function
- Status Request Function
- Set Parameters Function

Soft-Error Reporting Function

REM performs error detection and isolation by analyzing soft-error MAC frames that are periodically sent by ring stations experiencing errors. These MAC frames are sent to the functional address assigned to REM. REM analyzes the soft-error frames as they arrive and determines whether soft errors are occurring at a rate that potentially or currently degrades the performance of the ring. When REM detects such a condition, it notifies the IBM LAN Network Manager and, when possible, provides data indicating the probable source of the error.

The error counters included in a soft-error MAC frame sent by a station are divided into two types: *isolating* and *nonisolating*, which correspond to the type of error being reported. The source of an isolating error can be isolated to a fault domain; the source of a nonisolating error cannot be isolated to a domain smaller than the ring.

Nonisolating Soft-Error Processing Function

Nonisolating errors can be isolated only to the ring on which they occur. A counter is kept for each type of nonisolating error that is reported to REM in soft-error MAC frames. Some internal error counters are also treated as nonisolating errors. If one of these counters exceeds a threshold value, a notification is sent (through LRM) to the IBM LAN Network Manager application, and the REM soft-error counter is reset. No other analysis is performed by REM for nonisolating errors.

Isolating Soft-Error Processing Function

When REM receives a soft-error MAC frame, the accumulated isolating error count is interpreted as a weight. The weight associated with a particular station indicates the likelihood that station is causing excessive soft errors on the local ring. REM stores information on stations having nonzero weights in a table.

REM watches for an *excessive-soft-error threshold* in the table. Exceeding the threshold indicates that

- A problem exists on the local ring

- Ring performance is eroding as a result of this problem

Exceeding the threshold causes REM to notify the IBM LAN Network Manager of the error/ring-performance condition. The notification appears as a Weight Threshold event that you can view and interpret with the Bay Networks Events Manager tool.

Once you have determined the typical (noncritical or tolerable) error characteristics of the local ring, you can set a value for the Error Rate Threshold, which is an LNM interface parameter. The threshold you set provides for adequate warning of legitimate (performance-degrading) problems on the locally attached ring. (Until you make this determination, you can use the default Error Rate Threshold setting provided by the Bay Networks LNM Servers software.)

For information on how to access and edit the Error Rate Threshold parameter, refer to Chapter 4.

Intensive Mode Reporting Function

The REM Intensive Mode Reporting Function is a facility that enables an IBM LAN Network Manager to request a Ring Error Monitor to forward selected soft-error MAC frames. The requesting IBM LAN Network Manager receives the requested frames.

Receiver-Congestion Error Reporting Function

The REM Receiver-Congestion Error Reporting Function identifies stations that cannot receive a significant number of frames from the ring because their input buffers are full.

Status Request Function

The REM Status Request Function accepts and responds to requests for status from IBM LAN Network Manager.

Set Parameters Function

The REM Set Parameters Function accepts and executes requests from the controlling IBM LAN Network Manager to set REM’s parameters.

Ring Parameter Server (RPS)

The Bay Networks implementation of RPS is one of five LAN management servers you configure on a token-ring circuit. RPS provides the following main services:

- Sends initialization information to new stations that are attaching to the ring
- Ensures that stations on the ring have consistent values for operating parameters
- Forwards registration information from stations attaching to the ring to the IBM LAN Network Manager application

RPS also supports the following functions:

- Status Request Function
- Ring Station Parameters Maintenance Function
- Registration Function
- RPS Activation Function

Status Request Function

The RPS Status Request Function accepts and executes requests for status from the IBM LAN Network Manager application.

Ring Station Parameters Maintenance Function

The RPS Ring Station Parameters Maintenance Function issues commands to set parameter values in ring stations. The ring station operational parameters controlled by RPS are

- Ring number
- Soft-error report timer

Registration Function

The RPS Registration Function accepts unsolicited registration information from ring stations and forwards this information to the IBM LAN Network Manager application through LRM. RPS also responds to the station's request for registration by sending the current values for the ring's operational parameters to the requesting station.

RPS Activation Function

When a Ring Parameter Server becomes active on a ring, it determines if another RPS is already active on the ring. If another RPS is not active on the same ring, the RPS in the attaching station activates its Ring Station Parameters Maintenance Function. It then broadcasts an Initialize Ring Station MAC frame a predetermined number of times to all stations on the same ring. This mechanism facilitates the establishment of default ring operational parameters.

If another RPS is already active on the same ring, the new RPS compares the values received for the ring's operational parameters with its own stored values. If the values match, the RPS activates its RPS function. If the values do not match, the new RPS reports that its parameters are inconsistent with the existing parameters for the ring. The RPS then disables its own functional address, to prevent it from receiving requests for initialization from stations attaching to the ring.

Configuration Report Server (CRS)

The Bay Networks implementation of CRS is one of five LAN management servers you configure on a token-ring circuit. CRS accepts commands from the IBM LAN Network Manager application to get station information, set station parameters, and remove stations on the locally attached ring. CRS also collects and forwards configuration reports generated by stations on the local ring to the IBM LAN Network Manager application.

CRS supports the following functions:

- Station Status Request Function
- Set Station Parameters Function
- Remove Station Function
- Notification Function
- Communication Function

Station Status Request Function

The CRS Station Status Request Function accepts and executes requests from the IBM LAN Network Manager application to get the status of stations on CRS's ring and returns the results to the IBM LAN Network Manager application through LRM.

Set Station Parameters Function

The CRS Set Station Parameters Function accepts and executes requests from the IBM LAN Network Manager application to set the values of operational parameters in stations on CRS's ring. The success or failure of this operation is reported to the IBM LAN Network Manager application through LRM.

Remove Station Function

The CRS Remove Station Function accepts and executes requests from the IBM LAN Network Manager application to force a station to leave CRS's ring. The success or failure of this operation is reported to the IBM LAN Network Manager application through LRM.

Notification Function

The CRS Notification Function forwards information about configuration changes on CRS's ring to the IBM LAN Network Manager application through LRM. The configuration changes reported are new Active Monitor and new Next Active Upstream Neighbor.

Communication Function

The CRS Communication Function determines the types of frames sent between CRS and the IBM LAN Network Manager application, using the LRM reporting link.

LAN Bridge Server (LBS)

The Bay Networks implementation of LBS is one of five LAN management servers you configure on a token-ring circuit. LBS keeps statistical information about frames forwarded between two rings (through a source-routing bridge) and sends this information to selected IBM LAN Network Managers (through LRM).

LBS supports the following functions:

- Status Request Function
- Set Parameters Function
- Notification Function
- Bridge Performance Monitoring Function

Status Request Function

The LBS Status Request Function accepts and responds to requests for status from the IBM LAN Network Manager application.

Set Parameters Function

The LBS Set Parameters Function accepts and executes commands from a controlling IBM LAN Network Manager. The commands change the operational parameters of LBS.

Notification Function

The LBS Notification Function collects inter-ring traffic statistics and forwards this information to the IBM LAN Network Manager application. This function also notifies IBM LAN Network Manager of LBS state changes.

Bridge Performance Monitoring Function

The LBS Bridge Performance Monitoring Function maintains counters for

- The number of frames and bytes forwarded through the bridge
- The number of frames not received by a bridge station because the station was congested

Periodically the percentage of frames lost or discarded by the bridge because of anomalies is calculated and, if the percentage exceeds a predefined threshold, LBS sends a notification to the IBM LAN Network Manager application.

LBS can also be configured to periodically send its error and traffic counters to the IBM LAN Network Manager application to allow for trend analysis by the application.

For More Information about the LAN Management Servers

The following publications provide technical detail on Token Ring LANs, Source Routing Bridges, the IBM LAN Network Manager application, and the LAN Network Management Servers LRM, REM, RPS, CRS, and LBS:

IBM Corporation, SC303374-2. *IBM Token Ring Network Architecture Reference.* Third Edition. September 1989.

IBM Corporation, 31G6962. *IBM LAN Network Manager User's Guide*. December 1991.

IBM Corporation, SA21-9994-0. *IBM 8209 Local Area Network Bridge*.

IBM Corporation, 31G6960. *IBM Token Ring Network Bridge Program Version 2.2 User's Guide*. Fifth Edition. 1990.

Perlman, Radia. *Interconnections: Bridges and Routers*. Reading, MA. Addison-Wesley Publishing Company. May 1992.

Chapter 2
LNM Servers Implementation Notes

This chapter provides basic guidelines for configuring and using the Bay Networks LNM Servers, and for using IBM LAN Network Manager versus the Site Manager for LNM Server operations.

Initial Configuration

When you configure the LNM Servers on a Bay Networks router, both Site Manager and IBM LAN Network Manager require specific configuration information, as described in this chapter.

Site Manager

When you select the LNM Servers in the Protocols selection window, the Configuration Manager tool automatically selects Source Routing and LLC2. You must supply the following information to Site Manager through the Configuration Manager tool:

- Source Routing global parameters (Internal LAN ID, Bridge ID, Group LAN ID)
- Source Routing interface parameters (Ring Number)
- LNM Servers interface parameters (refer to “Internal MAC Address”)
- Line parameters (refer to “External MAC Address”)

Refer to the following sources for information on how to access and edit these parameters:

- Chapter 4 (for Internal MAC Address, an LNM Servers interface parameter)
- *Configuring Bridging Services* (for Source Routing Bridge global and interface parameters)
- *Configuring Routers* (for the MAC address specified as a Circuit/Line-Detail parameter)

IBM LAN Network Manager

To acquire knowledge of LNM Servers on a Bay Networks router, the IBM LAN Network Manager program requires you to

- Define source-routing bridges in your network. (You supply the MAC address on each side of any source-routing bridge configured with LAN management servers.)
- Link to source-routing bridges in your network. (You use the Bridge Linking function of the IBM LAN Network Manager program.)

Each MAC address must be unique within the associated source-routing network. The two MAC addresses you need to supply to IBM LAN Network Manager are called

- Internal MAC Address (associated with the Internal LAN of the router)
- External MAC Address (associated with the token-ring circuit you wish to monitor or control by means of IBM LAN Network Manager workstations)

Figure 2-1 shows a Bay Networks router configured with several Source Routing Bridge interfaces, each of which supports a set of LNM Servers. Each set of Servers in turn monitors activity on a locally attached token ring segment. The diagram shows the locations logically associated with the Internal and External MAC addresses required by an IBM LAN Network Manager workstation for each LNM-capable bridge on a router. The diagram also shows the locations logically associated with the Internal LAN ID and the external Ring IDs.

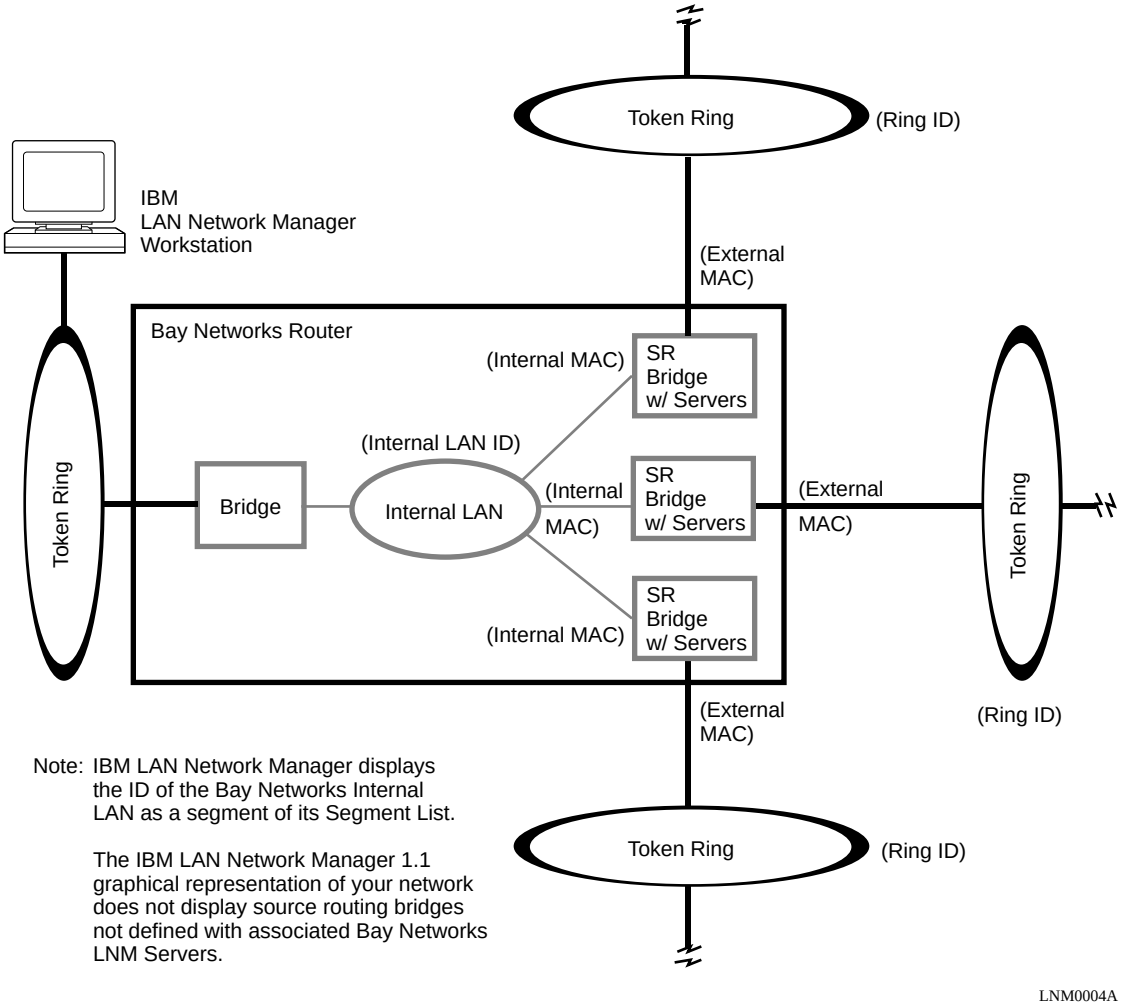


Figure 2-1. Source Routing, LNM, and Line Parameters

Internal MAC Address

Internal MAC Address is an LNM Servers interface-level parameter. You must enter an internal MAC address when you initially add an LNM Servers interface to the router configuration.

The only requirement for the Internal MAC Address parameter is that its value always be unique within the associated source-routing network. For information on how to access or edit this parameter, refer to Chapter 4, "Editing LNM Servers Parameters."

External MAC Address

Each circuit on which you need to configure an LNM Servers interface has an associated MAC address on the locally attached token-ring segment. You set this address by means of the MAC Address Select parameter of the circuit associated with that segment. You can access the MAC Address Select parameter by means of the following procedure:

1. **Select Circuits > Edit Circuit from the Configuration Manager window. (This invokes the Circuits List window.)**
2. **In the Circuits List window, click on the name of a circuit on which you want to configure an LNM Servers interface.**
3. **Click on Edit in the Circuits List window. (This invokes the Circuit Definition window.)**
4. **From the Circuit Definition window, select Lines > Edit Line to access the MAC Address Select parameter.**

The MAC Address Select parameter allows three options:

- BOXWIDE
- PROM (Default setting)
- CNFG

Caution: Do not use the BOXWIDE option of the MAC Address Select parameter associated with any circuit on which you wish to configure an LNM Servers interface. If you do, the IBM LAN Network Manager application is unable to differentiate between LNM Servers on different circuits of a Bay Networks router.

If you use the PROM-based MAC address option (the default) for a given circuit, you must subsequently use the Quick Get function of the Statistics Manager tool to discover the actual address written into the LNM interface record for that circuit. (For information on how to use the Quick Get tool, refer to *Managing Routers and BNX Platforms*.) Once you obtain the address supplied by the PROM associated with that circuit, you can enter the value into the appropriate parameter field of the IBM LAN Network Manager application.

If you choose the CNFG (user-configured) option, you must also enter a unique value into the MAC Address Override parameter field associated with that circuit. As with the PROM-based option, the address you enter into the MAC Address Override parameter field must be unique within the associated source-routing network.

Using IBM LAN Net Manager to Set LNM Parameters

Bay Networks router software does not allow the Controlling IBM LAN Network Manager application to set MIB values on a Bay Networks router. The LNM "Set" Privilege global parameter has a default setting of Disable for this reason. Site Manager allows you to change the setting of this parameter to Enable, but you must use only the default Disable setting.

If you attempt to use IBM LAN Network Manager to set the value of a parameter in the MIB, you receive an error message such as the following one from LAN Network Manager:

```
Bridge parameters could not be set
for the listed reason (n)
eporting Link 0-8
DFIPD456E
```

In this example, the Reporting Link number is 0, and the Reason Code is 8, which means that the Bay Networks router rejected the SET operation.

For more information on messages of this type, refer to the *IBM LAN Network Manager User's Guide*.

Number of RPS Servers per Ring

The *IBM Token Ring Network Architectural Reference* specifies that only one RPS server should exist on each token-ring segment. You must ensure that among all Bay Networks bridges and other bridges on a given segment, only one RPS server is enabled.

Redundant Servers on a Ring

The IBM LAN Network Manager workstation might have its own set of management servers monitoring the segment locally attached to that workstation. Refer to Figure 2-1. If this is true, then you need not enable the LNM Servers on the Bay Networks source-routing bridge interface to the same segment.

Passwords

Bay Networks system software includes ASCII password functionality for the Controlling and Observing IBM LAN Network Manager applications. You can use the password parameters of the LNM Servers Interfaces screen to support password-only access for up to four (authorized) Reporting Links to the LRM Server for a given bridge. (LRM can communicate with the Controlling IBM LAN Network Manager and up to three Observing IBM LAN Network Managers.)

This capability is defined as a Security Function in the *IBM Token Ring Network Architectural Reference*. This Security Function maintains and checks passwords that are used to authenticate users of Reporting Links, usually network administrators who are using the IBM LAN Network Manager application.

The designated Controlling and Observing IBM LAN Network Manager applications automatically receive notification when LRM in a given source-routing bridge rejects an attempt by an unauthorized IBM LAN Network Manager to establish a Reporting Link to that LRM server.

Chapter 3
Enabling LNM Servers

This chapter describes how to enable LNM Servers. It assumes you have

1. Opened a configuration file.
2. Specified router hardware if this is a local-mode configuration file.
3. Selected the link or net module connector on which you are enabling LNM.

Enabling LNM Servers on an Interface

To enable LNM Servers on an interface, complete the following steps:

1. **Select LNM from the WAN Protocols menu; this menu appears after you select a link or net module connector that requires a WAN circuit.**

   Protocol prioritization is enabled automatically when you select LNM. For detailed information on protocol prioritization, refer to *Configuring Traffic Filters and Protocol Prioritization.*

2. **Click on OK to enable default LNM Servers.**

   The Configuration Manager displays the Select Protocols window. Go to the appropriate protocol-specific guide for information on enabling the protocols you want to run on this interface.

   When you enable LNM Servers, you do not have to configure any LNM parameters. The Configuration Manager supplies default values for all LNM parameters. If you want to edit these default values, refer to Chapter 4.

Chapter 4
Editing LNM Servers Parameters

This chapter describes how you use Site Manager software to

- Access LNM Servers parameters
- Edit LNM Servers global parameters
- Edit LNM Servers interface parameters
- Delete LNM Servers from a circuit
- Delete all LNM Servers from the router

Once you successfully enable a set of LNM Servers on the router, you can use Site Manager to edit parameters associated with the servers. Note that you can add only one set of LNM Servers per physical circuit.

This chapter assumes that you have already added one or more source-routing bridges and LNM default interfaces to a router configuration file you want to edit. (Refer to *Configuring Routers* if you need to add LNM Servers to the configuration file.)

When you configure the LNM Servers on a token-ring attachment circuit, you supply information required by lower-layer protocols (MAC, LLC, and Source Routing). These protocols together support local session termination, connection, and source-routing services for the LNM Servers on that physical circuit.

For each LNM parameter, this chapter provides information about default settings, valid parameter options, the parameter function, instructions for setting the parameter, and the Management Information Base (MIB) object ID.

The Technician Interface allows you to modify parameters by issuing **set** and **commit** commands with the MIB object ID. This process is equivalent to modifying parameters using Site Manager. For more information about using the Technician Interface to access the MIB, refer to *Using Technician Interface Software*.

Caution: The Technician Interface does not verify that the value you enter for a parameter is valid. Entering an invalid value can corrupt your configuration.

Accessing LNM Servers Parameters

To edit LNM Servers global or interface parameters, you begin from the Configuration Manager window. Select Protocols > LNM Servers to invoke the LNM Servers options submenu.

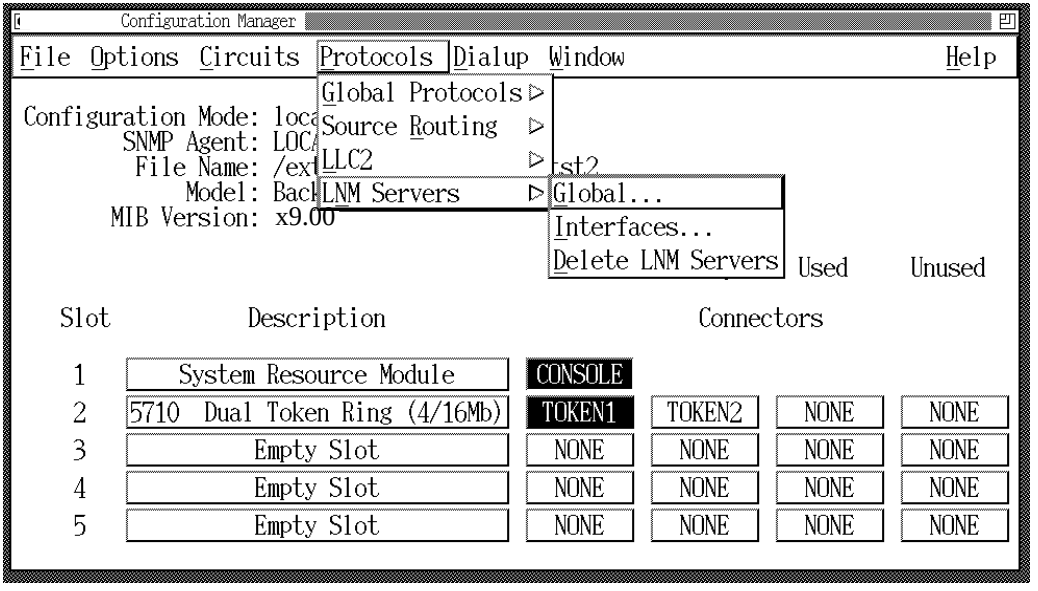


Figure 4-1. Configuration Manager Window

Editing LNM Servers Global Parameters

To edit the LNM Servers Global parameters, begin at the Configuration Manager window (Figure 4-1) and proceed as follows:

1. **Select Protocols > LNM Servers > Global.**

   The Edit LNM Global Parameters window appears (Figure 4-2).

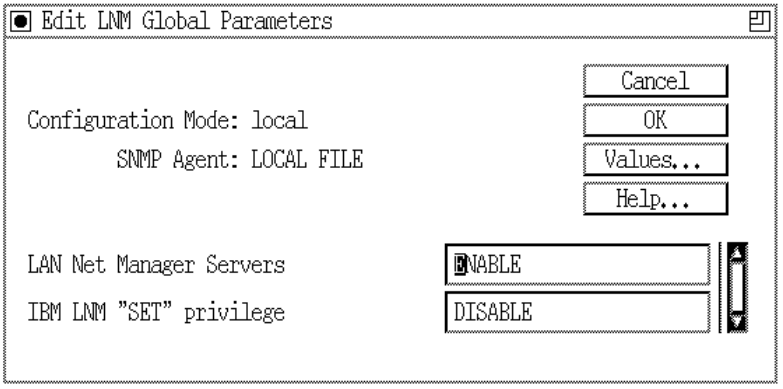


Figure 4-2. Edit LNM Global Parameters Window

2. **Change one or both of the LNM global parameters, as appropriate for your current IBM LAN Network Manager observation or control requirements.**

   Use the descriptions that follow as a guide.

3. **Click on OK to save your changes and exit the window.**

Parameter:	**LAN Net Manager Servers**
Default:	Enable
Options:	Enable | Disable
Function:	Globally enables or disables the system software mechanisms that allow users to add LNM Servers to any physical circuit. Other significant actions performed by the system software when you choose a setting are *Disable* -- Forces every LNM Server existing on this slot into the “down” (inoperative) state. *Enable* -- Reinitializes every LNM Server existing on this node, with each subsystem maintaining the most recent setting of its own Interface Enable/Disable parameter. The actual up/down operating state of each subsystem at the time of global reinitialization further depends on the current operational state of the associated circuit.
Instructions:	Select Disable to force every LNM Server existing on this node into the “down” (inoperative) state. Select Enable only when existing LNM Servers are in the Disabled state. You can globally reinitialize all local LNM Servers, with each server maintaining the most recent setting of its own Interface Enable/Disable parameter.
MIB Object ID:	1.3.6.1.4.1.18.3.5.12.1.2

Parameter:	**IBM LNM “SET” privilege**
Default:	Disable
Options:	Enable | Disable
Function:	Grants or denies the Controlling IBM LAN Network Manager application the ability to set MIB values that affect the operation of any target LNM Servers configured on this node.
Instructions:	For version 7.60 (or higher) of the router system software, leave the setting of this parameter to Disable. The Disable setting prevents the Controlling IBM LAN Network Manager application from setting MIB variables for any target LNM Servers configured on this router.
MIB Object ID:	1.3.6.1.4.1.18.3.5.12.1.4

Editing LNM Servers Interface Parameters

Any LNM Servers interface you add to a token-ring physical circuit inherits from the LNM Servers Global facility a default set of LNM Servers parameter values. You can use the Configuration Manager to access and modify parameters pertaining to the LNM Servers for a specific ring. To do so, begin at the Configuration Manager window (Figure 4-1) and proceed as follows:

1. **Select Protocols > LNM Servers > Interfaces to display the LNM Interface Configuration window (Figures 4-3 and 4-4).**

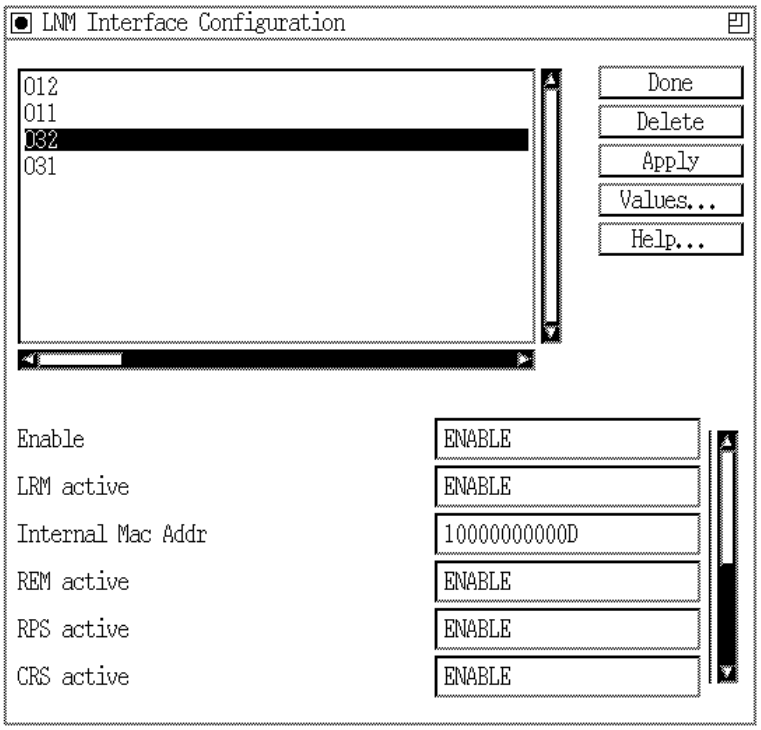


Figure 4-3. LNM Interface Configuration Window

Figure 4-4. LNM Interface Configuration Window (Scrolled)

2. **Select/highlight the interface you want to modify. The parameters associated with that interface appear in the parameter value windows.**
3. **Modify the values of those parameters you wish to change.**

   Use the discussions that follow as a guide.
4. **Click on Apply to save your changes.**
5. **Click on Done to exit the LNM Interface Configuration window.**

Parameter: **Enable**

Default: Enable (the Configuration Manager automatically sets this parameter to Enable for any LNM Servers you add to the node)

Options: Enable | Disable

Function: Enables or disables the LNM Servers on this interface.

Enable -- Initializes the LNM Servers you added to a physical circuit. Use the Enable setting also to reinitialize an existing LNM Server disabled earlier. The actual operating state of an interface, once enabled, further depends on

- The current state of the associated circuit
- The current state of the LNM Servers slot-wide protocol process

Disable -- Forces LNM Servers on this slot into the "down" (inoperative) state.

Instructions: Select *Enable* if you previously set this parameter to Disable and now wish to re-enable LNM Server operation on the associated physical circuit.

Select *Disable* only if you wish to disable LNM Server operation on the associated circuit. Setting this parameter to Disable does not interfere with the ability of the IBM LAN Network Manager application to communicate with other management servers in the same source-routing network.

MIB Object ID: 1.3.6.1.4.1.18.3.5.12.2.1.2

Parameter: **LRM active**

Default: Enable

Options: Enable | Disable

Function: Use this parameter to switch the LAN Reporting Mechanism on or off.

Instructions: Select Disable to switch LRM off. Switching off this LRM server breaks off the local reporting links to the Controlling and Observing IBM LAN Network Manager applications. This action has no effect on the reporting links associated with other rings in the same source-routing network.

Select Enable to switch LRM on.

MIB Object ID: 1.3.6.1.4.1.18.3.5.12.2.1.6

Parameter:	**Internal MAC Addr**
Default:	None
Options:	Any valid, unique, 48-bit MAC address in MSB (Token Ring) format
Function:	Specifies a MAC address on the Internal LAN for source-routing bridges configured on this router. The IBM LAN Network Manager application uses this destination address for communication with the LNM Servers enabled on this circuit.
Instructions:	Enter as hexadecimal characters a unique, 48-bit MAC address in MSB (Token Ring) format. For example, enter **0x** followed by 12 hexadecimal digits.
MIB Object ID:	1.3.6.1.4.1.18.3.5.12.2.1.5

Parameter:	**REM active**
Default:	Enable
Options:	Enable | Disable
Function:	Switches the Ring Error Monitor on or off. Switching REM off curtails any further collection of error information from stations on the local ring. The system purges any data collected by REM up to the moment you disable it. Switching REM on resumes the collection of error information from stations on the local ring.
Instructions:	Select Disable to switch REM off. Select Enable to switch REM on, if previously disabled.
MIB Object ID:	1.3.6.1.4.1.18.3.5.12.2.1.9

Parameter:	**RPS active**
Default:	Enable
Options:	Enable | Disable
Function:	Use this parameter to switch the Ring Parameter Server (RPS) on or off. Switching RPS off prevents RPS from automatically providing parameter information to new stations attaching to the local ring. Switching RPS on restores its operation on the local ring.
Instructions:	Select Disable to switch RPS off. Select Enable to switch RPS on, if previously disabled.
MIB Object ID:	1.3.6.1.4.1.18.3.5.12.2.1.11

Parameter:	**CRS active**
Default:	Enable
Options:	Enable | Disable
Function:	Switches the Configuration Report Server (CRS) on or off. Switching CRS off curtails the maintenance of information on the configuration of its local ring. With CRS off, the IBM LAN Network Manager application cannot remove stations from the ring associated with that CRS. Switching CRS on restores its operation on the local ring.
Instructions:	Select Disable to switch CRS off. Select Enable to switch CRS on, if previously disabled.
MIB Object ID:	1.3.6.1.4.1.18.3.5.12.2.1.13

Parameter: **Error Rate Threshold**

Default: 128

Range: 10 to 256

Function: Specifies when an *excessive-soft-error threshold* condition exists on the local ring. An exceeded threshold indicates that

- At least one significant problem exists on the local ring
- Ring performance is eroding as a result of this problem

Exceeding the threshold causes REM to notify the IBM LAN Network Manager of the error/ring-performance condition. The notification appears as a Weight Threshold event you can view and interpret through the Events Manager.

Instructions: Once you determine the typical (noncritical or tolerable) error characteristics of a ring, you can set an Error Rate Threshold that provides adequate warning of legitimate (performance-degrading) problems on that ring. Until you make this determination, you can use the default error threshold setting provided by the LNM Servers software.

MIB Object ID: 1.3.6.1.4.1.18.3.5.12.2.1.23

Parameter: **Control Manager Password**

Default: None

Options: Any valid password, consisting of up to eight ASCII characters

Function: Use this parameter to specify a password that allows the Controlling IBM LAN Network Manager workstation access to the LNM Servers for the locally attached ring.

Instructions: Enter any valid, unique password.

MIB Object ID: 1.3.6.1.4.1.18.3.5.12.2.1.15

Parameter:	**OB1 Manager Password**
Default:	None
Options:	Any valid password, consisting of up to eight ASCII characters
Function:	Use this parameter to specify a password that allows Observing IBM LAN Network Manager workstation number 1 to have noncontrolling access to the LNM Servers for a given ring.
Instructions:	Enter any valid, unique password, consisting of up to eight ASCII characters.
MIB Object ID:	1.3.6.1.4.1.18.3.5.12.2.1.16

Parameter:	**OB2 Manager Password**
Default:	None
Options:	Any valid password, consisting of up to eight ASCII characters
Function:	Use this parameter to specify a password that allows Observing IBM LAN Network Manager workstation number 2 to have noncontrolling access to the LNM Servers for a given ring.
Instructions:	Enter any valid, unique password, consisting of up to eight ASCII characters.
MIB Object ID:	1.3.6.1.4.1.18.3.5.12.2.1.17

Parameter:	**OB3 Manager Password**
Default:	None
Options:	Any valid password, consisting of up to eight ASCII characters
Function:	Use this parameter to specify a password that allows Observing IBM LAN Network Manager workstation number 3 to have noncontrolling access to the LNM Servers for a given ring.
Instructions:	Enter any valid, unique password, consisting of up to eight ASCII characters.
MIB Object ID:	1.3.6.1.4.1.18.3.5.12.2.1.18

Deleting LNM Servers from a Circuit

To delete LNM Servers from their associated physical circuit:

1. **From the LNM Interface Configuration window (Figure 4-3), select the LNM Server interface you wish to delete from the node configuration.**
2. **Click on Delete.**

The system software deletes the LNM Servers entry you selected. The entry disappears from the list of LNM Servers in the LNM Interface Configuration window.

Deleting the LNM Servers from the Bay Networks Node

To delete all LNM Servers from a Bay Networks node, begin at the Configuration Manager window (Figure 4-1) and complete the following steps:

1. **Select Protocols > LNM Servers > Delete LNM Servers.**

   A confirmation window appears.

2. **Select OK.**

   The Configuration Manager window appears.

The Bay Networks LNM Servers for the IBM LAN Network Manager are no longer configured on the node.

Appendix A
Site Manager Default Settings

Tables A-1 and A-2 show the Site Manager default parameter settings for the LAN Network Manager (LNM) application. Use the Configuration Manager to edit these default settings.

Table A-1. LNM Global Parameters

Parameter	Default
LAN Net Manager Servers	Enable
IBM LNM “SET” privilege	Disable

Table A-2. LNM Servers Interface Parameters

Parameter	Default
Enable	Enable
LRM active	Enable
Internal MAC Addr	None
REM active	Enable
RPS active	Enable
CRS active	Enable
Error Rate Threshold	128
Control Manager Password	None
OB1 Manager Password	None

(continued)

Table A-2. LNM Servers Interface Parameters *(continued)*

Parameter	Default
OB2 Manager Password	None
OB3 Manager Password	None

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